



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,894	01/29/2004	Yasuyuki Tamura	042069	2503
38834	7590	02/07/2006	EXAMINER	
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP 1250 CONNECTICUT AVENUE, NW SUITE 700 WASHINGTON, DC 20036			KIM, SU C	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 02/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/765,894

Applicant(s)

TAMURA ET AL.

Examiner

Su C. Kim

Art Unit

2823

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 22 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,4,5,7,9 and 11 is/are pending in the application.
- 4a) Of the above claim(s) 12-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,4,5,7,9 and 11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/22/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

REMARK / ARGUMENT

By the response of office action mailed on 08/23/2005, claims 12-23 are withdrawn. Claims 1, 3, 6, 8, and 10 are cancelled. Claims 2, 5, and 7 are amended.

DETAILED ACTION

Claim Rejections - 35 USC § 102

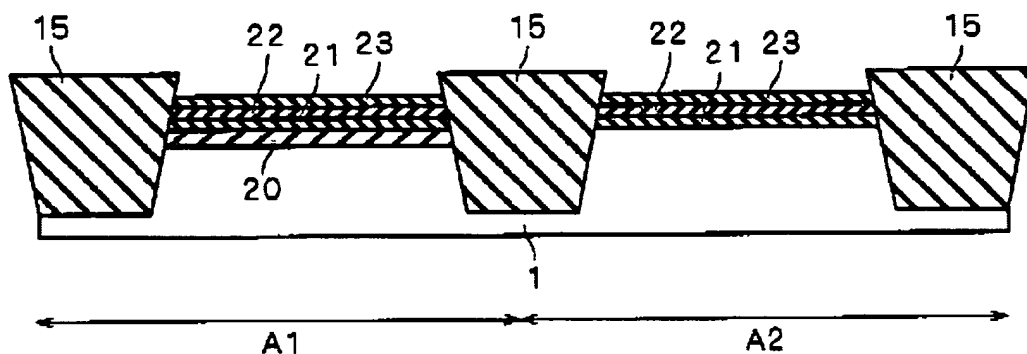
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 2, 4, 5, & 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Ota (US Pub 2002/0047170).

F I G . 2 8



Ota discloses a semiconductor device as claimed. **See all the FIGS** where Ota teaches the following limitations

1. Pertaining claim 2, Ota discloses a semiconductor device comprising:

a first gate insulation film **20-23** formed on a first region of a semiconductor substrate **1** and including a silicon oxide-based insulation film **20 (SiO₂)**, a high dielectric constant film **21 & 22 (HfSiO₂ & HfO₂>SiO₂)** formed on the silicon oxide-based insulation film and having a higher dielectric constant than silicon oxide film, and an oxygen diffusion preventing film **23 (HfSiO₂, hafnium silicate oxide)** formed on the high dielectric constant film and having a lower oxygen diffusion coefficient than the high dielectric constant film;

a first gate electrode **Q1** formed on the first gate insulation film (**Fig. 29**);

a second gate insulation film **21-23** formed on a second region of the semiconductor substrate **1** and including the high dielectric constant film **21 (element 21 is directly deposited and element 22 is additionally deposited on the substrate, both element are high dielectric constant)** formed directly on the semiconductor substrate and the oxygen diffusion preventing film formed **23** on the high dielectric constant film **21 & 22**; and

a second gate electrode **Q2** formed on the second gate insulation film.

2. Pertaining claim 4, Ota discloses a semiconductor device according to claim 2, wherein the high dielectric constant film **22 (HfO₂)** is hafnium oxide film or a zirconium oxide film.

3. Pertaining claim 5, Ota discloses semiconductor device according to claim 2, wherein the oxygen diffusion preventing film is a silicon nitride film, an alumina film, an aluminum silicate film, a hafnium aluminate film or a hafnium silicate film **23 (HfSiO₂)**.

4. Pertaining claim 7, Ota discloses a semiconductor device comprising:

a first gate insulation film **21-23** formed on a first region of a semiconductor substrate **1** and including a silicon oxide-based insulation film **20 (element 20, SiO₂)** and a

Art Unit: 2823

reduction-retardant high dielectric constant film **21 & 22 (HfSiO₂ & HfO₂>SiO₂)** formed on the silicon oxide-based insulation film **20** and having a higher dielectric constant than silicon oxide film;

a first gate electrode **Q1** formed on the first gate insulation film;

a second gate insulation film **21-23** formed on a second region of the semiconductor substrate **1** and including the high dielectric constant film **21 (HfSiO₂)** formed directly on the semiconductor substrate, the second gate insulation film; and

a second gate electrode **Q2** formed on the second gate insulation film.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9 & 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Samavedam et al. (US Pub 2004/0023478).

5. Pertaining claim 9, Ota fails to teach a semiconductor device according to claim 7, wherein the high dielectric film is a hafnium aluminate film. Samavedam discloses high-k dielectric material, hafnium oxide can be replaced by hafnium aluminate.

(Paragraph 21). In view of Samavedam, it would have been obvious to one of ordinary skill in the art to incorporate the process step of Samavedam into the Ota because work function can be optimized for each type of device **(Column 1 paragraph 4, lines 8-10).**

6. Pertaining claim 11, Ota fails to teach a semiconductor device according to claim 9, wherein an alumina content ratio of the hafnium aluminate film is above 50 % including 50 %. However, given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. *See In re Aller, Lacey and Hall* (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodru* ; 919 f 2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any differences in the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)

Appellants have the burden of explaining the data in any declaration they proffer as evidence of non-obviousness. *Ex parte Ishizake*, 24 USPQ2d 1621, 1624 (Bd. Pat. App. & Inter. 1992).

An Affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a prima facie case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Gilmer et al (US 2004/0032001), Tseng (US 2002/0072168), JP 2002-134739, JP 2000-349287, & JP 2003-023100.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Su C. Kim whose telephone number is (571) 272-5972. The examiner can normally be reached on Monday - Thursday, 9:00AM to 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Su C. Kim
02/02/2006



W. DAVID COLEMAN
PRIMARY EXAMINER